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ABSTRACT

The United States Training and Employment Service General Aptitude Test Battery (GATB), first published in 1947, has been included in a continuing program of research to validate the tests against success in many different occupations. The GATB consists of 12 tests which measure nine aptitudes: General Learning Ability; Verbal Aptitude; Numerical Aptitude; Spatial Aptitude; Form Perception; Clerical Perception; Motor Coordination; Finger Dexterity; and Manual Dexterity. The aptitude scores are standard scores with 100 as the average for the general working population, and a standard deviation of 20. Occupational norms are established in terms of minimum qualifying scores for each of the significant aptitude measures which. when combined, predict job performance. Cutting scores are set only for those aptitudes which aid in predicting the performance of the job duties of the experimental sample. The GATB norms described are appropriate only for jobs with content similar to that shown in the job description presented in this report. A description of the validation sample is included. (AG)

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TECHNICAL REPORT

ON

STANDARDIZATION OF THE GENERAL APTITUDE TEST BATTERY

FOR

Packer (Glass Mfg.) 8-65.01

B-463 or S-192

TM 002 959

U. S. Employment Service in
Cooperation with
California State Employment Service

U. S. DEPARTMENT OF LABOR
Bureau of Employment Security
Washington 25, D. C.

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EDUCATION & WELFARE
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STANDARDIZATION OF THE GENERAL APTITUDE TEST BA[illegible]

FOR

PACKER (Glass Mfg.) 8-65.01

B-463 or S-192

Summary

The General Aptitude Test Battery, B-1002, was administered to a sample of 45 female and 13 male Packers 8-65.01 employed by the Glass Container Corporation, Los Angeles, California. The criterion consisted of supervisory ratings based on a descriptive rating scale. On the basis of mean scores, standard deviations, correlations with the criterion, job analysis data, and their combined selective proficiency, Aptitudes Q--Clerical Perception, K--Motor Coordination, and M--Manual Dexterity were selected for inclusion in the test norms.

GATB Norms for Packer 8-65.01 B-463 or S-192

Table I shows, for B-1001 and B-1002, the minimum acceptable [illegible] for each aptitude included in the test norms for Packer 8-65.01.

TABLE I

Minimum Acceptable Scores on B-1001 and B-1002 for B-463 or S-192

B-1001			B-1002		
Aptitude	Tests	Minimum Acceptable Aptitude Score	Aptitude	Tests	Minimum Acceptable Aptitude Score
Q	CB-1-B	70	Q	Part 1	[illegible]
T	CB-1-G CB-1-K	75	K	Part 8	80
M	CB-1-M CB-1-N	105	M	Part 9 Part 10	[illegible]

Effectiveness of Norms

The data in Table V indicate that 10 of the 19 poor workers, or 53 percent of them, did not achieve the minimum scores established as cutting scores on the recommended test norms. This shows that 53 percent of the poor workers

would not have been hired if the recommended test norms had been used in the selection process. Moreover, 30 of the 39 workers who made qualifying test scores, or 77 percent, were good workers.

I. Purpose

This study was conducted to determine the best combination of aptitudes and minimum scores to be used as norms on the General Aptitude Test Battery for the occupation of Packer 8-65.01.

II. Sample

The General Aptitude Test Battery, B-1002A, was administered during the period August 11 to August 18, 1960 to a sample of 54 female and 22 male packers employed by the Glass Container Corporation, Los Angeles, California. Eighteen workers were excluded from the final sample: fifteen because they had not completed the training period, one because he had reached only fifth grade in school, and two because they were unable to understand and follow test instructions. The final sample, therefore, consisted of 45 female and 13 male packers.

The job applicant is required to complete a work application and is given an oral interview. Non-performance specifications are not rigid, but the company prefers newly employed trainees to be between 21 and 33 years of age, with 12th grade education. A pre-employment physical examination is required, but the only inflexible requirement is possession of at least 20-30 vision in both eyes. There have been no tests used in selection. On-the-job training is given individually by the immediate supervisor. The training period required to attain normal productive efficiency is estimated by the company to be about six months. All workers in the study are considered experienced workers.

Table II shows the means, standard deviations, ranges, and Pearson product-moment correlations with the criterion for age, education, and experience.

TABLE II

Means (M), Standard Deviations (σ), Ranges, and Pearson Product-Moment Correlations with the Criterion (r) for Age, Education, and Experience

N = 58

	M	σ	Range	r
Age (years)	34.8	8.1	21-53	.077
Education (years)	10.7	1.6	8-15	-.123
Experience (months)	30.8	39.1	1-188	.206

There is no significant correlation between age, education, or experience and the criterion. The data in Table II indicate that this sample is suitable for test development purposes with respect to age, education and experience.

III. Job Description

Job Title: Packer 8-65.01.

Work Performed: Inspects glass bottles and glass containers from bottle-making machine, rejects defective ware and packs selected ware into cartons.

Prepares carton for packing: Takes pre-assembled cardboard carton from overhead, gravity-fed roller conveyor, visually inspects carton for defects and positions accepted carton on box holder at side. Opens top flaps, bends back and adjusts spacers in carton if necessary. Consults job specification card to determine selection requirements. Pulls down metal plate go/no-go case bottle gauge, attached to top of box holder stand, to fit plate's bottle holes over top of case, when specifications call for gauging body size.

Multiple line selector and packer: Picks up four bottles, two in each hand from annealing oven conveyor, forms them into a square with necks up and visually inspects necks, throat openings and bottoms of bottles for defects. Places defective bottles in offware tray or bin. Shifts bottles so that they are in a row, necks pointing away from worker and bodies supported by palms of both hands. Rotates bottles to visually inspect body of each bottle for defects such as checks, splite and discoloration and places defective bottles in offware tray or bin. Positions throat-openings of bottles onto four stationary, parallel throat gauges, rotates bottles on gauges and rejects bottles that do not meet required specifications. Removes bottles from gauges and inserts accepted bottles neck down into carton or through holes of plate gauge into carton. Places off-size bottles in offware tray or bin. Repeats operation until carton is filled, stamps personal code number on flap, folds flaps closed and places carton on roller conveyor or pallet. Maintains pace with annealing oven conveyor in selecting and packing.

Straight line selector and packer: Visually inspects bottles passing in single file in front of fluorescent light panel. Picks out bottles with defects such as bent necks and checked or wash-board finishes and places defective bottles in offware tray or bin.

Observes operation of automatic throat gauging machine attached to line, stops machine when bottle breaks, and clears jaws and conveyor line of broken glass. Discards broken glass in bin and starts machine. Notifies supervisor if breakage is excessive. Visually inspects bottles passing in single file, picks out and discards defective bottles. Adjusts position of bottles on line when necessary to facilitate operation of throat gauging machine.

Picks up two to four bottles from revolving line receiving table, visually inspects bottoms of bottles and over-all quality according to job specification card. Places defective bottles in offware tray or bin. Inserts accepted bottles into carton and repeats operation until carton is filled. Stamps personal code number on flap, folds flaps closed and places carton on roller conveyor or pallet.

Note: Works as a member of a team. Due to eye fatigue, light line inspection is rotated among the straight line workers every 30 minutes.

Performs duties common to all selectors and packers: Keeps mental count of offware by quantity of each type of defect and reports to supervisor or to inspector if offware exceeds 10%. Requests inspector to solve questionable reject problems. Performs reselection of ware rejected by quality control inspector, or repacks ware from one type of carton to another. Selects and packs a large variety of glass containers from gallon jars and jugs to 1½ounce ink bottles. May examine ware with measuring devices such as height, case and finish gauges to inspect body sizes, thread dimensions and over-all height dimensions. Maintains clean and orderly work area.

IV. Experimental Battery

All of the tests of the GATB, B-1002A, were administered to the sample group.

V. Criterion

The criterion consisted of supervisory ratings made on an adaptation of Form Sp-21, "Descriptive Rating Scale". The rating scale consisted of eight items with five alternatives for each item to indicate the degree of job proficiency. Weights of one through five were assigned to each alternative so that the minimum possible score was eight and the maximum forty. One set of ratings was obtained from the shift foreman who was the immediate supervisor of each worker.

Also, a set of broad category ratings was obtained from the production foreman. Each worker was classified in one of three classifications: A-Superior worker, B-Satisfactory worker, or C-Not completely satisfactory worker. Broad category ratings were converted to numerical scores of 60 for the A group of 21 workers, 49 for the B group of 19 workers, and 39 for the C group of 18 workers.

Since the coefficient of reliability between the descriptive rating scale and broad category rating scores was .74, the ratings obtained from the shift foreman were selected as the final criterion because this set of ratings was based on long periods of close supervision and therefore was judged to be more valid measure of performance. Distribution of the final criterion scores ranged from 15 to 40, with a mean of 29.379 and a standard deviation of 4.870.

Statistical and Qualitative Analyses

A. Statistical Analysis:

Table III shows the means, standard deviations, and Pearson product-moment correlations with the criterion for the aptitudes of the GATB. The means and standard deviations of the aptitudes are comparable to general population norms with a mean of 100 and a standard deviation of 20.

TABLE III

Means (M), Standard Deviations (σ) and Pearson Product-Moment Correlations with the Criterion (r) for the Aptitudes of the GATB

PACKER 8-65.01

N = 58

Aptitudes	M	σ	r
G-Intelligence	89.138	13.863	.028
V-Verbal Aptitude	90.879	13.775	.075
N-Numerical Aptitude	85.276	15.400	.020
S-Spatial Aptitude	92.603	15.700	-.150
P-Form Perception	94.672	15.836	.006
Q-Clerical Perception	96.448	12.922	-.028
K-Motor Coordination	96.586	15.666	.226
F-Finger Dexterity	98.724	18.019	-.049
M-Manual Dexterity	108.810	17.952	.226

For a sample of 58 cases, correlations of .337 and .259 are significant at the .01 level and the .05 level of confidence, respectively. None of the aptitudes correlates significantly with the criterion.

B. Qualitative Analysis:

The job analysis indicated that the following aptitudes measured by the GATB appear to be important for this occupation.

Form Perception (P) - required to visually inspect bottles and detect flaws in glass and irregularities of shape.

Motor Coordination (K) - required to maintain pace with conveyer in selecting and packing ware. Required to quickly position bottles onto gauges and to fit them into packing cartons.

Finger Dexterity (F) - required to remove small pieces of broken glass, and to pick out defective small bottles from conveyer belt.

Manual Dexterity (M) - required to pick up, shift, and handle bottles, and to position them onto gauges. Required to open carton flaps, pack bottles into cartons, and to close carton flaps.

On the basis of the job anlysis data, the following aptitude was considered obviously unimportant for performing the duties of this job and was considered as an "irrelevant" aptitude: Aptitude V.

C. Selection of Test Norms

TABLE IV

Summary of Qualitative and Quantitative Data

Type of Evidence	Aptitudes								
	G	V	N	S	P	Q	K	F	M
Job Analysis Data									
Important					X		X	X	X
Irrelevant		O							
Relatively High Mean						X	X	X	X
Relatively Low Sigma	X	X				X			
Significant Correlation with Criterion									
Aptitudes to be considered for trail norms						Q	K	F	M

Trial norms consisting of various combinations of three and four of Aptitudes Q, K, F, and M with appropriate cutting scores were evaluated against the criterion by means of the tetrachoric correlation technique. A comparison of the results showed that B-1002 norms consisting of Q-75, K-80, and M-100 had the best selective efficiency.

VII. Validity of Norms

The validity of the norms was determined by computing a tetrachoric correlation coefficient between the test norms and the criterion and applying the Chi Square test. The criterion was dichotomized by placing as close as possible to one-third of the sample in the low criterion group. A criterion critical score of 27 was used and resulted in 19 of the workers on 32.8 percent of the sample being placed in the low criterion group.

Table V shows the relationship between test norms consisting of Aptitudes Q, K, and M with critical scores of 75, 80, and 100 respectively, and the dichotomized criterion for Packer 8-65.01. Workers in the high criterion group have been designated as "good workers" and those in the low criterion group as "poor workers."

TABLE V

Validity of Test Norms for Packer 8-65.01

(Q-75, K-80, M-100)

N = 58

	Non-Qualifying Test Scores	Qualifying Test Scores	Total
Good Workers	9	30	39
Poor Workers	10	9	19
Total	19	39	58

$r_{tet} = .48$ $\quad X^2 = 3.813$

$\sigma r_{tet} = .22$ $\quad P/2 < .05$

The data in the above table indicate a significant relationship between the test norms and the criterion for the sample.

VIII. Conclusions

On the basis of the results of this study, Aptitudes Q, K, and M with minimum scores of 75, 80, and 100 respectively, have been established as B-1002 norms for the occupation of Packer 8-65.01. The equivalent B-1001 norms consist of [illegible] T-75, and M-105.

IX. Determination of Occupational Aptitude Pattern

The specific norms established for this study did not meet the requirements for allocation to any of the existing 35 occupational aptitude patterns. The data for this sample will be considered for future groupings of occupations in the development of new occupational aptitude patterns.